

When “Aloha!” Means Goodbye—to Pests



Growers of anthuriums must be on the alert for banana rust thrips. Because the small, winged insects are difficult to detect, biologist Robert Hollingsworth has improvised traps to determine how many adult thrips are emerging from the soil beneath anthurium flowers.

Curbing Pests in Hawaii's Ornamental Paradise

Small, stealthy snails can cause even the most regal of Hawaii's greenhouse-grown orchids to flop sadly in their pots. The tiny mollusks, called orchid or bush snails, feast on surface or lateral roots that would otherwise keep the exotic blooms upright.

Known to scientists as *Zonitoides arboreus*, the molluscan marauders are hard to detect and even harder to kill with commercial chemicals, according to Agricultural Research Service biologist Robert G. Hollingsworth.

A new member of the scientific team at the U.S. Pacific Basin Agricultural Research Center in Hilo, Hawaii, Hollingsworth is hunting for ways to combat the snails. The little pests have a bluish-grey body and a yellow-brown, translucent shell. A full-grown adult is smaller than a fingernail.

Hollingsworth is also targeting two other floral crop foes. They are insects called thrips and coffee green scales. His experiments should lead to new, effective, and more environmentally friendly ways to protect not only orchids, but also other splendid tropical flowers like gardenia, anthurium, ginger, bird-of-paradise, and heliconia, plus an array of exotic tropical palms. These and other long-lasting cut flowers and hardy potted plants from Hawaii command premium prices at nurseries and floral shops worldwide.

Nail That Snail!

For the most part, small businesses, often family run, make up Hawaii's \$70 million ornamental crops industry. In a survey that Hollingsworth and colleague Kelvin T. Sewake of the University of Hawaii conducted among orchid growers, about half of those queried complained that the orchid snail costs them, on average, about \$5,000 a year in control expenses and lost sales.

The snail's protective coloration and small size make it hard to find in soil

substitutes—bark, peat moss, cinder, or pieces of coconut husk, called coir—used to fill greenhouse pots. Too, the snails live and work independently. That makes them harder to spot than if they stayed in groups.

"We aren't finding them in heavy concentrations," reports Hollingsworth, "but even if only two or three of these snails are feeding on an orchid in a 4-inch pot, they're pretty much going to eat up all of the surface roots in only a couple of months."

These factors can make it hard for growers to know that they have a snail problem until the besieged blooms topple over. "By that time, if growers do use a chemical," says Hollingsworth, "sometimes it won't work. And even if it does, the results often aren't obvious because the snails—dead or alive—are so hard to find."

Right now, Hollingsworth is trying to learn more about the snail's little-known biology. And, he's working to build a large colony of wild snails for use in greenhouse and petri dish tests of molluscicides.

"These chemicals are our best options right now," he says, "but most were developed for other pests—like garden slugs—not for this snail."

Thwarting Thrips

Orchids and other lush tropical plants need protection from other pests, as well as from snails. Small, winged insects known as thrips, for example, like to feed on leaves, stems, and flowers. Nearly invisible to the naked eye, pests such as palm thrips (*Thrips palmi*), which attack orchids, or banana rust thrips (*Chaetagnaphothrips signipennis*), which trouble anthuriums, can wreak havoc in greenhouses.

Hollingsworth, along with Kelvin Sewake and Arnold H. Hara of the University of Hawaii, have developed new guidelines for scouting, or detecting, thrips in shadehouse or greenhouse orchids.

SCOTT BAUER (K9054-1)



Flower of bird-of-paradise.

SCOTT BAUER (K9011-1)



Orchid color plays a role in attracting thrips. Here, Robert Hollingsworth (left) and *Dendrobium* orchid grower Clarence Ono discuss which colors are most likely to attract the pest.

SCOTT BAUER (K9015-1)



Yellowish coffee green scales produce a sweet, sticky liquid called honeydew. The substance is a food source for this black sooty mold fungus on these gardenia leaves.

About 26 percent of the orchid growers that Hollingsworth and co-researchers surveyed in Hawaii said they scout their orchids for thrips. Their decision of whether or not to spray plants may be based on how many thrips they find. These growers apply pesticides about 25 times a year.

In contrast, some growers spray according to the calendar, applying pesticides regardless of whether or not they've actually spotted any thrips. They spray about 38 times a year.

Until now, says Hollingsworth, growers who opted to scout "didn't have data indicating how many samples were really necessary." To fill that gap, Hollingsworth, Sewake, and Hara investigated thrips populations on orchids, then developed a new, practical, and statistically sound sampling strategy. Says Hollingsworth, "Growers can use it to determine how many orchids they need to sample to have a reasonably good chance of detecting thrips. Once they've followed the sampling protocol, they can decide whether to apply insecticide."

No Break for the Coffee Green Scale

A six-legged, soft-bodied insect called coffee green scale can plague gardenia,

ginger, and a host of other crops—including citrus and, of course, coffee. The insect, known as *Coccus viridis*, stunts growth and causes leaves to yellow.

The adults are oval and greenish yellow. Various species of ants befriend them, chasing away predators and parasites that might otherwise make a quick snack of the scales. In return, ants get to nosh on honeydew that the scales produce.

To avoid infestations, shipments of fragrant, creamy-white gardenias from Hawaii to the U.S. mainland have been banned since 1948. "Gardenias," says Hollingsworth, "can't be used in flower leis or taken home by tourists—much to the disappointment of many of our visitors."

Now, data gathered by Hollingsworth and Hara might help change all that. They tested hundreds of gardenia blossoms and leaves in experiments with more than a half dozen pesticide dips. They recommended to USDA's Animal and Plant Health Inspection Service that the best-performing of these dips—combined with inspections of growers' fields every 6 months and of the flowers just before shipment—should ensure that the gardenias are free of coffee green scale. APHIS specialists are now reviewing the

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Biologist Robert Hollingsworth examines *Dendrobium* orchid flowers to determine how thrips are typically distributed in this crop.



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Despite their small size, these 1/4-inch-wide snails (called *Zonitoides arboreus*) are capable of destroying the thick corky roots of the orchid plant.

recommendations.

In the meantime, Hollingsworth plans to use coffee green scales infesting gardenia leaves as a research model. That means they'll be an essential part of new tests of promising compounds that might zap a variety of other floral pests.

One target: long-tailed mealybug (*Pseudococcus longispinus*). It attacks plants like ginger, heliconia, or palms. The insect gets its name from the tail-like filaments that trail behind the oval bodies of the adults.

"Mealybugs have a protective waxy coating on their bodies that makes them fairly impervious to insecticides," Hollingsworth notes. "We'd like to help growers develop an improved spray or dip that would keep their cut flowers and potted plants free of mealybug hitchhikers."—By **Marcia Wood, ARS.**

This research is part of Crop Protection and Quarantine, an ARS National Program (#304) described on the World Wide Web at <http://www.ars.usda.gov/programs/cppvs.htm>.

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SCOTT BAUER (K9016-1)



Shipments of gardenias to the U.S. mainland have been banned since 1948 because of fears that they carry coffee green scale insects. But Hollingsworth's research with insecticide dips may change that.